

HamSCI Meteor Scatter QSO Parties 2026

HamSCI METEOR SCATTER QSO PARTY 2025 RESULTS & 2026 PLANS

2025 was the inaugural year for HamSCI's Meteor Scatter QSO Party, with results from both the August and December events now available at hamsci.org/msqp. A significant amount of data was collected from the participants: those who made 2-way contacts and those who monitored the 6- and 10-meter bands. Especially welcome was that data submitted in the form of WAV files — sound recordings of the radio signal 'pings' as they were reflected from ionized meteor trails. It was especially gratifying to note that over half the participants self-identified as 'meteor scatter rookies,' operating during a meteor shower for the first time in their ham radio careers.

2026 will bring some changes to the MSQP. It is likely that we will hold more events, looking for operations during additional showers throughout the year. The scoring model may change as well, with the concept of a Meteor Scatter Leaderboard under discussion. One thing won't change: we will continue to encourage submission of WAV files, as they will likely hold the key to understanding more about how and why meteor scatter contacts are possible.



THOUGHTS ON HamSCI

The Spring Semester is an exciting time at HamSCI... the HamSCI Workshop, the Dayton Hamvention, final exams, thesis defenses, and graduations all occur within just a few weeks of each other. Like New Years, it is a time to celebrate what we have accomplished, reflect on the past, and prepare as we embark on the new adventures before us.

As I look back over the past year, we have accomplished so much and have so much to be proud of. Just a few short weeks ago, our HamSCI community met up in Connecticut for the first HamSCI Workshop hosted by the ARRL- a momentous occasion to be sure. As I had the opportunity to walk through ARRL HQ during our Saturday afternoon tour, it was amazing to see the history there... artifacts from over a century of promoting amateur radio, radio engineering, and radio science (including the actual trans-Atlantic tests hat!). But perhaps most exciting of all was that we were not simply there to look at this history, but we were there to contribute to it in real-time.

The workshop showcased so many of the fantastic projects we have here at HamSCI – the Solar Eclipse QSO Party, the Meteor Scatter QSO Party, the Personal Space Weather Station, HF Channel Sounding project – just to name a few. With almost 50 presentations, tutorials, and demonstrations, and almost 150 people gathering at the workshop from across the world, I certainly feel that we made a true contribution to amateur radio and radio science. I watched a community come together, share their work, make friends, and leave with the spark of new ideas.

As always, this issue of the HamSCI newsletter highlights the many people, activities, and experiments that make HamSCI unique and valuable. I look forward to working with everyone in the HamSCI community as we continue to advance amateur radio and radio science.

— Dr. Nathaniel Frissell, Ph.D. W2NAF





HamSCI 2026

DISCOVERING SCIENCE THROUGH AMATEUR RADIO

MARCH 14-15, 2026
HOSTED BY ARRL
CENTRAL CONNECTICUT
STATE UNIVERSITY
NEW BRITAIN, CT
hamsci.org/hamsci2026

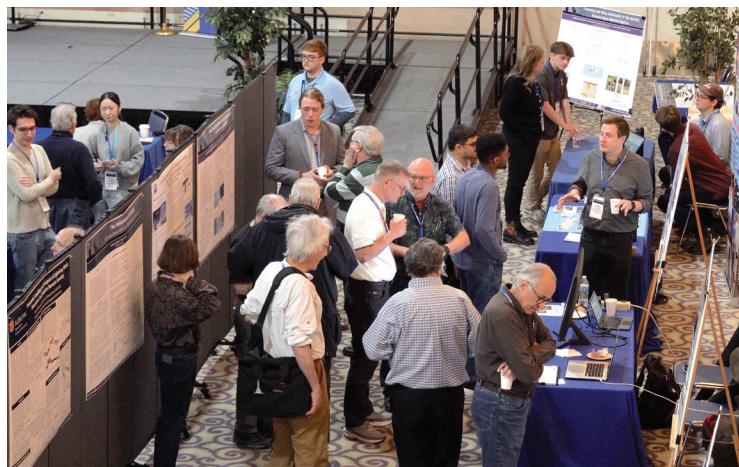
THE 2026 HamSCI WORKSHOP

By Gary Mikitn AF8A

HamSCI held its ninth annual Workshop on March 14-15, 2026, hosted by the American Radio Relay League (ARRL), Newington, CT. The event consisted of 17 oral presentations, 3 tutorials, 5 demonstrations, 32 posters and a Saturday night banquet, held on the campus of Central Connecticut State University. Unique to this workshop were tours of ARRL headquarters and operating hours at the ARRL's Maxim Memorial station, W1AW, perhaps the best-known amateur radio callsign in the world. W1AW that night also made a bit of history with its first 630 meter QSOs with K9KFR and then W3TS using FST4.

The oral presentations were given by a broad cross section of the HamSCI community. They were arranged into themed sessions, such as Personal Space Weather Stations updates and observations, analysis of space weather data, tools and techniques for collecting and classifying space weather data, student research, and new opportunities for citizen scientist participation. Most presentations were given in-person, while four virtual talks were given by presenters in Japan, Tunisia, England, and the United States.

The highlight for many was the four-hour poster session, where authors informally presented on a multitude of topics, including recent research, citizen science observations, ideas



Poster Session (Image courtesy Bob Inderbitzen NQ1R)

for future HamSCI projects, hardware and software tools. Among the posters were six demonstration tables, displaying instrumentation, interactive tutorials "design a digital filter", and live software demos.

Full details, including links to presentations and posters, are at hamsci.org/hamsci-2026-program.



The 9th HamSCI Workshop Attendees

SCIENTIST PROFILE KULDEEP PANDEY

By Mary Lou West, KC2NMC

Kuldeep Pandey moved to the big city of Mumbai (14 million people) after a childhood in a small village in northern India. His father was a high school science teacher, and Kuldeep followed his love of science and mathematics. He received his Ph.D. in space science in Gujarat in western India in 2019, and then became a postdoc at the University of Saskatchewan in Saskatoon, Canada. In their Institute of Space and Atmospheric Studies, he learned about electric fields and currents in space and in the upper atmosphere and saw auroras. He compared models with HF radio polarization using ePOP satellite datasets. Their fluctuations and varying locations and time periods intrigued him.

As a Postdoctoral Research Associate at New Jersey Institute of Technology (NJIT) in Newark since 2024, Kuldeep works on ionospheric electrodynamics and high frequency radio propagation under quiet and disturbed space weather conditions. At NJIT, he discovered HamSCI and is part of the team now. His first solar eclipse was the partial eclipse in Scranton in April 2024. He finds it heartening that our mathematics is so accurate and is looking forward to experiencing a total solar eclipse someday. Kuldeep is now investigating the effects of solar eclipses on the ionosphere and HF radio wave propagation, including using ray tracing models.

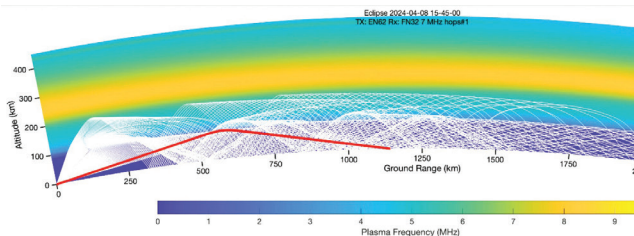
He looks forward to someday having the opportunity to get his ham radio license. The curiosity and emergency preparedness of the ham community impress him.

For relaxation, Kuldeep enjoys hiking and finding waterfalls and lakes.

The HamSCI community is lucky to have this master computer analyst among us. For more details, visit his webpage: <https://sites.google.com/view/kuldeep-pandey>



Kuldeep Pandey



Ray Trace eclipse
(Visual by Kuldeep Pandey)

HamSCI ANNOUNCES COLLABORATION AGREEMENT WITH ILDN

HamSCI has recently announced the creation of a formal collaboration with the Indian Lightning Detection Network (ILDN), which is led by Prof. Anirban Guha at the Dept. of Physics at Tripura University.

The ILDN is a citizen science lightning detection network based on VLF receivers deployed in India. It was developed jointly by Anirban Guha and Paul Nicholson.

The agreement, which was announced at the 2026 HamSCI workshop, is a data sharing agreement. For more details on the initiative, visit www.hamsci.org.



GOING TO DAYTON? HamSCI WILL SEE YOU THERE!



Don't forget to stop by the HamSCI booth at Hamvention and meet with the HamSCI team. The booth will be staffed by scientists, students, and volunteers eager to say hello and to catch up on the latest in ionospheric research and get your input as ham radio data collectors as citizen-scientists.

We will also be presenting at this year's convention. We discuss new results for the Solar Eclipse QSO Party, a version of the Personal Space Weather Station that you can build from scratch, Meteor Scatter QSO Party Results, and an upcoming collaboration with a NASA mission. Presenters will include Dr. Kuldeep Pandey, Bob Reif W1XP, Gary Mikitin AF8A, David McGaw N1HAC, and Dr. Nathaniel Frissell W2NAF.

Check the HamSCI and Hamvention websites for the latest details.

AMATEUR PROFILE

NORMAND JUNEAU VE2DVG

***How did you learn about HamSCI and how did you get involved?
How have you been involved in the past? What is your current involvement?***

In late 2023, I learned about HamSCI from the QRZ web site. I looked at the different projects from HamSCI, and the GRAPE 1 project really drew my attention. I never thought that a basic set-up could produce ionospheric Doppler measurements from WWV or CHU broadcasts. I was amazed by the simplicity of the concept. This is paradoxical; simplicity as a complex matter... So, in March 2024, I became a HamSCI member with the intent of building a GRAPE 1 Personal Space Weather Station (PSWS).

I couldn't have succeeded in soldering the mixer board PCB without the help of my wife, Céline, who kindly held the parts with tweezers. I miss the old days when soldering wires to a 5U4GT octal socket was a piece of cake. You didn't need to be a neurosurgeon!

Initially, the mixer board didn't seem to work. After numerous unsuccessful trials, I sent my male ego for a visit to the shed and asked for help. Gary Mikitin AF8A, put me in contact with Joe Hobart W7LUX. I sent him the mixer board. He tested it, it was working perfectly. The problem was finally traced back north of the border with the oscilloscope operator. So, my GRAPE 1 station went into operation on November 10, 2024.

I need to underline the unconditional help and mentoring I have gotten and still get from Joe. This is as best as "entraide" can be. Since, I have continued exchanges with Joe. We periodically trade GRAPE 1 Doppler plots for comparative purposes; other times it is about astronomy.

In one of our exchanges, Joe hinted to me that our respective stations had both detected a Doppler spike that seemed to be caused by a solar X-ray flare. I took the initiative to look more closely at this phenomenon. Then, I produced a series of plots about that solar X-ray flare event of 2025-11-04. Joe fostered me to present these plots to the group. These plots were presented at a HamSCI Informal Zoom Get-Together.

What HamSCI projects interest you?

I considered building a WSPRSonde transmitter at one time. But nowadays, I keep a close watch on Rob Robinett's AI6VN WSPRDaemon SDR project. This is much heftier than my GRAPE 1 project to undertake, but this seems like the next logical evolution for my PSWS.

I'm still digging into the X-ray flare events. Kristina Collins KD8OXT pointed out to me her presentation about the Doppler flashes of

October 28, 2021, event. From the original eight PSWS stations listed in her presentation, W7LUX, AD8Y, KB1HFT, and W2NAF are still reporting data today. I plan to track these GRAPE 1 to study their signal responses when significant daytime X-ray flares occur (Class X). I am open to any suggestions about this.

What skills do you have that are best suited to HamSCI? How might other amateurs obtain similar skills?

I started coding with R studio to produce Doppler plots from the GRAPE 1's CSV files. It's a skill I need to reappropriate, since I haven't done any coding for decades.



Normand Juneau VE2DVG

Formal and informal HamSCI gatherings provide awareness and opportunities to promote skills. But most importantly, skill diversity among the HamSCI members is the finest asset to the group.

What type(s) of equipment do you have in your shack? Antennas?

I have an HF station feeding a low profile 204 ft horizontal loop antenna (through to an outdoor remote antenna tuner). I'm operating on all the HAM bands from 160m to 10m. My HF antenna is, par la force des choses, on a time-sharing basis between the HF station operation and the PSWS.

HamSCI had me discovering a meteoric communication mode by having a talk about it. I participated in the Meteor Scatter QSO Party. This mode is almost cryptic by its nature.

How active a ham would you say you are? When were you first licensed? License class?

I got my Amateur Radio Operator's Certificate, in high school

STAFF PROFILE

EMMA MORAN KD3CKD

Hello! My name is Emma Moran, and as of November 2025, I've been working under Dr. Nathaniel Frissell as a Post-Bacc Research Assistant to further the work of the HamSCI collaboration. I graduated last spring with a B.S. in astronomy and physics (with a certification in Science Communications!) from the University of Pittsburgh. I began research in the summer of 2023 and have worked mostly in observational and computational astrophysics since. While I worked on multiple projects in that time, my primary research concerned machine learning redshift estimates, and from that work, I have my very first first-author paper published in the *Astrophysical Journal*. See <https://doi.org/10.3847/1538-4357/ae2ace>.



Emma Moran KD3CKD

But one of the projects I worked on was NASA's National Eclipse Ballooning Project, where undergrad teams across the country launched weather balloon-radiosonde apparatuses to observe the 2023 and 2024 eclipses via radio. That project was unique among my experiences, as it had me in the field, down in Concan, Texas, during both eclipses, and the work also gave me my first exposure to working in instrumentation. After graduating from Pitt, I knew I wanted to work a little bit more before grad school, and in my search for a research position, I found Dr. Frissell's posting for a research assistant, and after reading about the connections between HamSCI's work and my previous eclipse research, I knew I wanted the job.

For HamSCI, I am primary working on the Personal Space Weather Station project, working with many people to get the PSWS's deployed. I am currently working on the documentation that will accompany the PSWS and will eventually be the one shipping the stations across the country; on the side, I'm analyzing PSWS data of the 2024 eclipse, and will be writing up a paper on the observed Doppler measurements. In the future, I plan to attend a Ph.D. program in astrophysics, and through working for HamSCI, I'm hoping to improve my data analysis and instrumentation skills so I will be a stronger scientist in the future!

Editor's note: Emma and that of her three co-authors have recently published a paper titled *'Deep Learning Improves Photometric Redshifts in All Regions of Color Space'* in the *Astrophysical Journal*. Emma was at the University of Pittsburgh. She also has recently received her amateur General License and the callsign KD3CKD.

(1974) and my Amateur Radio Operator's Advanced Certificate the following year. My first ham station was a crystal-controlled transmitter (HeathKit DX-35) and a late 40s short-wave receiver (Hallicrafters S-40A). This hardware was connected to a scrounged TV 75 ohm-coax line feeding a 40m dipole.

All those years, I've been active or semi-active on HF bands, operating in CW and in the last few years, FT-8. I probably have fewer than 20 QSOs in SSB. I still operate FD with my high school friends after all these years.

I may say that HF propagation has been tempering with my life for the best and worst conditions...

What would you say is the future of HamSCI? What should HamSCI be doing to increase its awareness and provide more value to you as a ham?

The HamScience Program talks do a fantastic job at disseminating knowledge, ideas, skills and promoting indiscriminate exchanges among its members. I thank Gary Mikitin AF8A and Dr. Mary Lou West KC2NMC for keeping this initiative living.

Learning, discovering, but most prominently: human relations, this is what HamSCI is all about for me as a ham.

Finally, a brief bio about yourself and your contribution to HamSCI as well as to scientific research.

I'm a PE with an electrical engineering degree and I'm an IEEE member. I started my career in the military as a communication and electronic engineer. Then I moved to civilian life and worked in the industry in production engineering and R&D. For the last 16 years, I've been working in the forensic engineering field. I'm 90% retired. Trying to fully retire, but the legal world doesn't let you go away that easily...

My contribution to HamSCI is rather very modest. I hope it helps keep science alive.

Alluding to science, science seems to be heading directly into a Dark Age period. This will undoubtedly prove to be the main challenge in the years to come for HamSCI. I suggest reading Carl Sagan's book: *The Demon-Haunted World: Science as a Candle in the Dark*.

In the end...

"In the end, all that mattered was that some matter learned matters most important: the curious mind never rests."

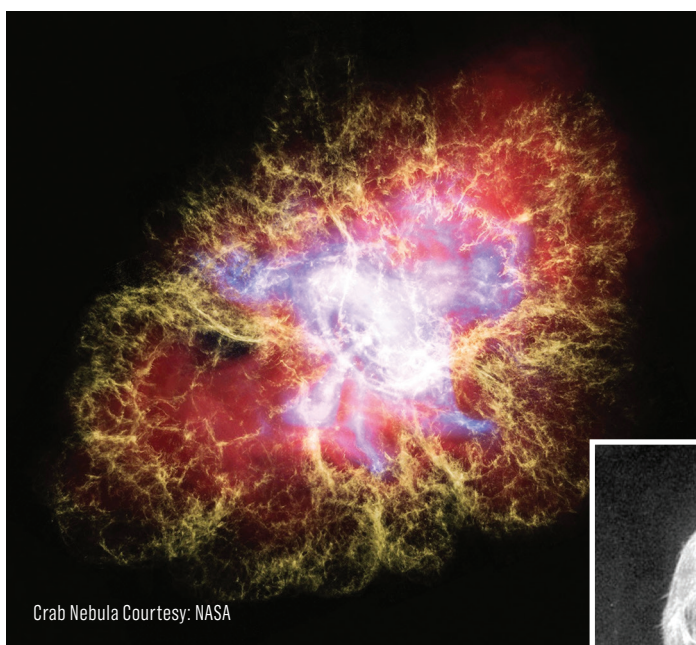
—Paul M. Sutter

CONTRIBUTOR COLUMN

Cream in your coffee? *By Ron Wilcox KF7ZN*

This article started with a comment on the HamSCI forum with a term that I knew little to nothing about. As has been the case with all of these articles that I have been writing, it inspired me to do some research. So, being curious, and having the internet as my gateway to explore, I share the following with you.

In 1842, while gold was being discovered in California, John Strutt was born in England. While in his youth, he experienced a steady stream of illnesses, some of them quite serious. His poor health led to quite a few interruptions of his early schooling. In fact, shortly after he got married, he contracted rheumatic fever which



became so serious it was not known for sure if he would survive. When he began to recuperate, he was told that a trip to Egypt would help, so he took his new bride, Evelyn Balfour, (who was the sister of the future prime minister, Sir Arthur James Balfour), and they set out on a houseboat up the Nile where they spent the winter. John took advantage of this time to start working on an important book called "The Theory of Sound". This book has been called foundational and is considered to be the beginning of the study of modern acoustic theory.

With the death of his father, John Strutt took on the title that most people know him by, Lord Rayleigh, 3rd Baron of Rayleigh.

He was meticulous in his research, and in 1868 he bought a complete set of scientific instruments to aid him in his private research efforts at his country seat at Terling, Essex. He had a complete wing built just for his laboratory.

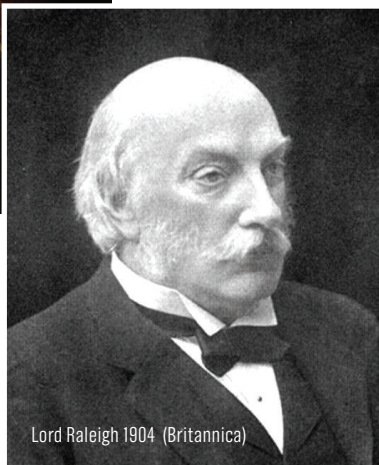
He was the first to discover the answer to a question I have been asked by my grandchildren, why is the sky blue? He showed that it is the result of the scattering of sunlight by small particles (nitrogen, oxygen, dust) in the atmosphere.

Strutt had two major scholarly appointments, the first being in 1879 when he was appointed Professor of Experimental Physics and Head of the Cavendish Laboratory at Cambridge to follow James Clerk Maxwell. The other was from 1887 to 1905 when he was Professor of Natural Philosophy at the Royal Institution of Great Britain, being successor of Tyndall.

He retained his passion for research and writing to an advanced age, working on some papers five days before his death on June 30, 1919. His interests and written work were wonderfully varied, ranging from sound, wave theory, color vision, electrodynamics, electromagnetism, light scattering, flow of liquids, hydrodynamics, density of gases, viscosity, capillarity, elasticity, and photography.

In 1892, while performing an experiment, he found that nitrogen derived from ammonia is about 0.5 percent less dense than

nitrogen taken from the atmosphere. He theorized that atmospheric nitrogen had something else in it. Rayleigh sent sparks through atmospheric nitrogen, which oxidized it, leaving a residue that could not be oxidized. He was sure that this was a new element. However, not only was it a new element, but it was a new kind of element, the first of the so-called noble or inert gases. William Ramsey, a chemist, and Rayleigh announced the discovery of argon in a joint paper in January of 1895. This is considered by many to be his greatest accomplishment.



There was some initial resistance to the claim that this was a new element, since it would not fit into the periodic table of Mendeleev, but when Ramsay discovered helium a few months later, which was a similar inert gas, it was evident that an entirely new column needed to be added to the periodic table to accommodate the new gases. Rayleigh would receive the Nobel Prize in Physics in 1904 for the discovery of argon, and Ramsay would be awarded the Nobel Prize in Chemistry that same year for the same discovery.

And finally, for our specific interest, in 1883, Rayleigh investigated the stability of a heavy fluid supported by a lighter fluid,



specifically in the context of cirrus cloud formation.

Now let us turn our attention to Geoffrey Ingram Taylor, who lived from 1886 to 1975. Taylor was a British physicist, the grandson of George Boole, (who created Boolean Algebra, which must be another topic for another day). He was

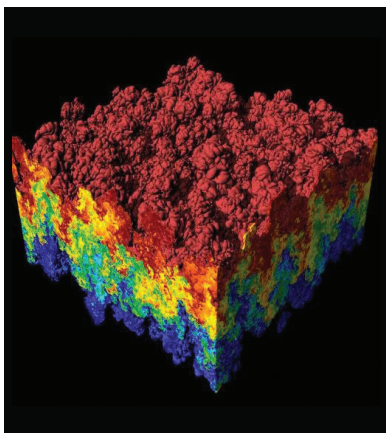
very influential in fluid dynamics and wave theory. He did much of his learning independent of formal schools, a process called autodidacticism (a new word for me), which is the process of learning and acquiring knowledge independently, without formal instruction or teacher guidance.

Taylor studied mathematics and physics at Trinity College, Cambridge, from 1905 to 1908. Let's pause here for a moment for those who (like me), may not know what it means to be a reader at a university. The title of reader in universities in the United Kingdom and some Commonwealth of Nations countries, is an appointment for a senior academic with a distinguished international reputation for research or scholarship. It can be thought of as a professor, but without a chair. However, as far as actual teaching, he both disliked it and felt he had no great aptitude for it.

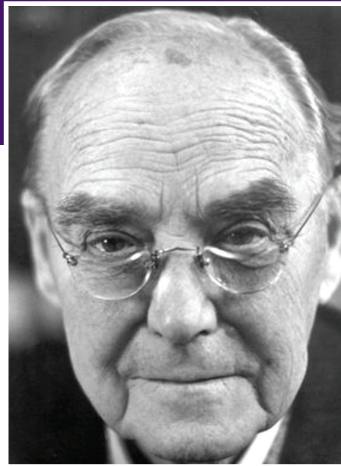
During World War I, Taylor used his knowledge of aircraft design, to help the military with the stress on propeller shafts. During this time, he learned to fly airplanes and studied the stability of parachutes by making parachute jumps.

In 1923, he was appointed to a Royal Society research professorship as a Yarrow Research Professor, which to his satisfaction enabled him to stop teaching,

He had a lifelong love of sailing and in the 1930s he invented the 'CQR' (Coastal Quick Release) anchor, a popular hinged plow-style anchor, renowned for its high holding power.



Rayleigh-Taylor Instability



Sir G.I. Taylor (Trinity College Chapel)

Sir G.I. Taylor did not collaborate directly, but rather developed the instability theory 67 years apart, from their joint works came the combined Rayleigh-Taylor instability. This occurs when a low-density fluid pushes a high-density fluid, or when a dense fluid is atop a lighter one. This causes the fluids to mix through what I found described as finger-like, mushroom-shaped structures. There are many videos I found on YouTube showing this interaction.

Here are some common examples of Rayleigh-Taylor instabilities

- ▶ Coffee with Cream: The most common thing is when someone puts cream in their coffee.
- ▶ Lava Lamps: The heated, less-dense wax rises through the denser oil, cools, and then sinks. Although some say that this is actually Rayleigh-Bénard convection due to the active heating.
- ▶ Mushroom Clouds: Hot, less-dense gas from explosions (nuclear or volcanic) pushes into colder, denser air above.
- ▶ Oceanography: Cold or salty (dense) water overlaying warmer or less-salty (light) water, often creating "salt fingers."
- ▶ Atmospheric Inversions: A layer of warm air trapping cooler air beneath it.
- ▶ Supernova Explosions: Hot supernova core material accelerates into denser, surrounding gas. One example I found frequently mentioned for this is the Crab Nebula, in which the expanding pulsar wind nebula powered by the Crab Pulsar is sweeping up ejected material from the supernova explosion 1,000 years ago.
- ▶ Industrial/Fluid Mixing: Water being poured onto oil, or, on a smaller scale, thick paint layers sagging before drying.
- ▶ Interstellar Gas: Dense gas clouds pushed by magnetic fields or cosmic rays.

I hope this has introduced or added to your knowledge of the scientists involved with the Rayleigh-Taylor Instability.

SOURCES:

- https://en.wikipedia.org/wiki/Rayleigh%E2%80%93Taylor_instability
- https://en.wikipedia.org/wiki/John_Strutt,_3rd_Baron_Rayleigh
- <https://www.britannica.com/biography/John-William-Strutt-3rd-Baron-Rayleigh>
- <https://www.nobelprize.org/prizes/physics/1904/strutt/biographical/>
- <http://trinitycollegechapel.com/about/memorials/brasses/taylor-gi/>
- <https://ancestors.familysearch.org/en/LHPV-LV6/evelyn-georgiana-mary-balfour-1847-1934>

HELIOPHYSICS BIG YEAR

By Dr. Kristina Collins KD80XT

Interested in reading some scientific papers but not sure where to start? Here's some recent scholarship of interest to members of the HamSCI community. If there's a paper you'd like to see featured in a future HamSCI newsletter, email KD80XT at kvcollins@spacescience.org.

TITLE: Special Topic in *Frontiers in Astronomy and Space Physics*: "Heliophysics Big Year: Education and Public Outreach Reports"

In this edition of Literature Review, we have a special report on a special topic: a collection of articles in *Frontiers of Astronomy and Space Physics* based on education and public outreach during the Heliophysics Big Year.

WHO ORGANIZED IT: The issue was edited by Hyunju Kim Connor and Michael S. Kirk of NASA Goddard Spaceflight Center, our own Gareth Perry KD2SAK of the New Jersey Institute of Technology, Pat Reiff W5TAR of Rice University, and yours truly as a topic coordinator.

WHAT'S A SPECIAL ISSUE? The tradition of special issues in journals began with the "Festschrift," or "celebration writing," a collection of scholarship celebrating the contributions of a prominent scientist, which can take the form of a book or a dedicated journal issue. In the twentieth century, it also became more common for journals to devote an issue to commemorate a particular conference or collect papers on a timely topic. As journal publishing has gone digital, it's become easy and common for publishers to assemble focused collections of papers on niche topics, in one journal or across multiple journals, and for scientists to propose new special collections. As with most aspects of academic publishing, some people will game the system to maximize citations —be wary of small collections that feature articles authored by the same people who are editing the issue! — but it can be a great way to create a venue for slightly unusual papers that don't quite fit anywhere else.

WHAT IT'S ABOUT: NASA's Heliophysics Big Year (<https://science.nasa.gov/sun/helio-big-year/>) was a global celebration of the Sun's influence on Earth and the entire solar system from October 14, 2023, to December 24, 2024. It encompassed annular and total solar eclipses across North America and concluded with NASA's Parker Solar Probe making its closest approach to the Sun. This special issue gathers papers about education and public outreach (EPO) activities, including citizen science, during the Big Year.

WHY IT'S IMPORTANT: EPO activities, like citizen science, often go unrecorded in the academic literature, because most people doing them are not incentivized to pursue academic publications. But when they do get published, they create durable documentation of what worked (and did not work) that future educators can build on. They also become citable in future papers and, perhaps more importantly, in grant applications for future projects.

 **frontiers** in Astronomy and Space Sciences

WHICH PARTS TO READ:

HamSCI made several contributions to the special issue. (Disclaimer: I am a coauthor on these ones.)

- Fernandes et al. present an analysis of long-term data from the Grape 1 PSWS at K2MFF in **Characterizing ionospheric variability through HF Doppler measurements: a statistical and numerical ray tracing analysis**. If you run a Grape station from your QTH, take a look at their data and see how different your HF environment is from NJIT's. DOI: <https://doi.org/10.3389/fspas.2026.1713968>
- Check out "HamSCI HF multipath propagation mode analysis using amateur radios and audio waveforms sensitive to time difference of arrival" by Cerwin et al., which features the work of our own Steve WA5FRF (profiled in the Spring 2025 issue of this very newsletter!) and other members of HamSCI. DOI: <https://doi.org/10.3389/fspas.2026.1723511>
- A tour de force from W8EDU: **Detecting changes in along-path HF propagation during the April 2024 total solar eclipse with radio amateurs and low-cost instrumentation** by Usis et al. tells the tale of a senior project collecting data along the April 2024 eclipse path with the help of CHU and an extraordinary band of volunteers. I am particularly proud of Section 6 in this one, which talks about the design of citizen science campaigns. DOI: <https://doi.org/10.3389/fspas.2025.1720301>

I also particularly recommend these:

- **Eclipse-induced geomagnetic signatures: the 2024 EZIE-Mag citizen science campaign contribution to the Heliophysics Big Year** by Mesquita et al., featuring citizen scientist data from the EZIE-Mag magnetometer campaign. Fans of the PSWS will love this ongoing project. <https://eziemag.jhuapl.edu/> DOI: <https://doi.org/10.3389/fspas.2025.1601396>
- As a big fan of the astrovisualization software OpenSpace and the aurora chasers of Aurorasaurus, I was delighted to see Resnick et al.'s **Explore space weather and the heliophysics big year through the Community Coordinated Modeling Center's (CCMC) hands-on tools and collaborations** feature OpenSpace visualizations of Aurorasaurus data. DOI: <https://doi.org/10.3389/fspas.2025.1700048>
- Covitt et al.'s **"Insights from and future directions for a nationwide science and engineering education collaboration in stratospheric ballooning"** manages to distill the lessons of the Nationwide Eclipse Ballooning Project (NEBP), a sprawling project with 53 student teams, into a readable and useful form for educators and aspiring scientific balloonists. It's not easy to coordinate a project this big, and I tip my inflatable hat to them. DOI: <https://doi.org/10.3389/fspas.2025.1659329>

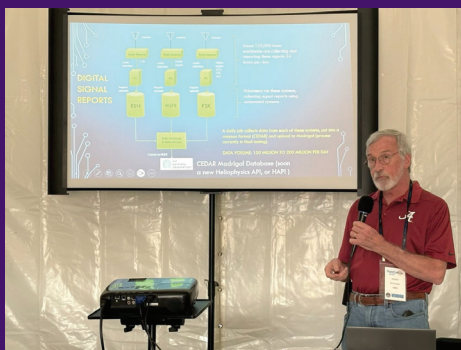
FIGURE HIGHLIGHT: One great thing about EPO reports is that they often feature photos of educators and citizen scientists in action. Check out Figure 1 in Smith et al., Figures 2-3 in Covitt et al., Figure 7 in Reiff et al, Figure 17 in Usis et al., and most of the figures in Shaver et al. for pictures of educators, students and scientists celebrating the Sun.

WHERE YOU CAN LEARN MORE: Check out the special issue at <https://www.frontiersin.org/research-topics/68226/heliophysics-big-year-education-and-public-outreach-reports>. All the articles are Open Access, so you can read and share them freely.

HAMSCI AT ORLANDO HAMCATION

HamSCI had a major presence at the annual February Orlando Hamcation. Our booth was staffed by Bill Engelke AB4EJ, Bob Reif W1XP, Gary Mikitin AF8A, and Ed Efchak WX2R. We met lots of new friends and had the chance to tell the HamSCI story and answer questions from many visitors.

Mr. Engelke and Mr. Mikitin also presented at a workshop forum which was well attended and ran far over-time with the sheer number of questions asked by the audience.



Bill Engelke AB4EJ



Gary Mikitin AF8A



HamSCI Orlando Volunteers L to R: Bob Reif W1XP, Bill Engelke AB4EJ, Gary Mikitin AF8A, Ed Efchak WX2R

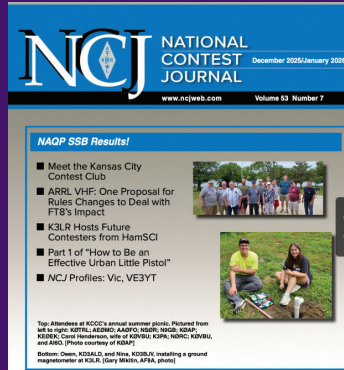
NOTES FROM ALL OVER

- » On April 11, Dr. Nathaniel Frissell W2NAF presented to the AMSAT South Africa National Technical Symposium on the importance of science in amateur radio for future development, focusing on space weather and HF radio propagation.
- » University of Scranton Computer Engineering major, Owen J. Ruzanski KD3ALD presented the "Development of A Contesting And Dxing Dashboard For The Hamsci Personal Space Weather Station" at the SARL National Technical Symposium in early April.
- » Gwyn Griffiths G3ZIL appeared in the April issue of RSGB *Radcom* magazine regarding his Time of Flight presentation at the recent HamSCI workshop. He was recently awarded the Wortley Talbot Trophy for 2025 by RSGB for "outstanding experimental work" as described in my article "Upper HF openings at night: one effect of travelling ionospheric disturbances," which was based on material, and feedback, from my talk on the same topic at the HamSCI 2025 HamSCI workshop.
- » RSGB also presented the Les Barclay Memorial Award to HamSCI volunteer Carl Luetzelschwab, K9LA in recognition of his excellent contributions to propagation research and understanding of the subject to amateur radio.
- » Dr. Frissell and Ethan Miller K8GU were awarded the 2025 Bill Orr W6Sai Technical Writing Award by the ARRL Foundation for their August 2025 article "About Traveling Ionospheric Disturbances."
- » HamSCI wishes to congratulate Stephen A. Cerwin, Jesse T. McHahan, Alexandros S. Papadopoulos, Gerard N. Piccini, Nathaniel A. Frissell, Kristina V. Collins, Anna Montaire, Paul Bilberry, Samuel Blackshear, and David R. Themens who have recently had their paper titled "HamSCI HF Multipath Propagation Mode Analysis Using Amateur Radio And Audio Waveforms Sensitive To Time Difference Of Arrival" published in the current issue of *Frontiers in Astronomy and Space Science*. <https://doi.org/10.3389/fspas.2026.1723511>
- » HamSCI also wishes to congratulate Sabastien Fernandes, Gareth W. Perry, Tiago Trigo, Dr. Nathaniel A. Frissell, John Gibbons and Dr. Kristina Collins for having recently had their paper titled "Characterizing Ionospheric Variability Through HF Doppler Measurements: A Statistical and Numerical Ray Tracing Analysis" published in the 10 March 2026 issue of *Frontiers in Astronomy and Space Science*. <https://doi.org/10.3389/fspas.2026.1713968>
- » HamSCI also wishes to congratulate Emma Moran who has recently had her paper (and that of her three co-authors) titled "Deep Learning Improves Photometric Redshifts in All Regions of Color Space" in the current issue of *The Astrophysical Journal*. Emma was at the University of Pittsburgh when she and her collaborators wrote the paper and has been recently hired at the University of Scranton as a Physics/EE Research Assistant. <https://doi.org/10.3847/1538-4357/ae2ace>

The first quarter of 2026 saw nearly
70 new members added to the
HamSCI Google group bringing the
total to just under 1,500 (1,497).

HamSCI IN THE NEWS ▶▶▶▶▶

HamSCI was featured as a cover story in the December – January 2026 issue NCJ/The National Contest Journal with a story of the work of 15 students, professors, and volunteers on HamSCI projects at the K3LR superstation in western Pennsylvania. The primary task was the installation of a HamSCI Personal Space Weather Station (PSWS) at the site. The students, who are all licensed hams, had the opportunity to operate at the station and learn the ins and outs of contesting.



National Contest Journal

Make sure you watch:
https://youtu.be/v9B3KyhFa0c?si=VX6XCsttiDMdbIL_

HamSCI is an active participant in the Do NASA Science program. To learn more about citizen science and join in, check out their Facebook page at <https://www.facebook.com/groups/Sciencing>.

Dr. Nathaniel Frissell was noted in the January – February 2026 issue of Practical Wireless magazine for winning the 2026 Carole Perry Educator of the Year award recognizing his work with the HamSCI education program.

The University of Scranton was recently awarded a three-year, \$600,000 grant from the Office of Naval Research for a project titled, "Crowdsourced Observations for Ionospheric Model Validation and a Diagnostic Approach for Forecasting Equatorial Spread F." The project will combine crowdsourced ionospheric observations, via the Ham Radio Science Citizen Investigation (HamSCI) community, and physics-based modeling that will be used to create improved ways of testing and improving ionospheric forecasts. The grant's principal investigator is Kornyanat "Kukkai" Hozumi, Ph.D., the group's research scientist. <https://news.scranton.edu/articles/2026/02/news-onr-grant-radio.shtml>

HamSCI scientist Dr. Kristina Collins KD8OXT was recently noted in EOS magazine for her efforts to work with up-and-coming students in projects ranging from hacking to tinkering to scavenging to crowdsourcing. Dubbed "The McGuyver Sessions" – this year, as a part of AGU, it featured the largest program yet on space weather, ocean environments, the geosphere and crowdsourced science in which HamSCI is a pioneer. The link with all the details is here: <https://eos.org/articles/celebrating-the-macgyver-spirit-hacking-tinkering-scavenging-and-crowdsourcing>.

DR. NATHANIEL FRISSELL HONORED AT ORLANDO HAMCATION

HamSCI was featured at the conference banquet with Dr. Nathaniel Frissell receiving the Carole Perry Educator of the Year award which was accepted by Gary AF8A. HamSCI was prominently noted in the ARRL Southeast Division meeting with CEO David Minster N2AA mentioning HamSCI's work along with our partnership with the ARRL.



L to R: John Knott N4JTK, Carole Perry WB2MGP, Gary Mikitin AF8A, Mike Banigan KJ4UD0

HAMSCI NEWSLETTERS NOW ARCHIVED

Need to retrieve a past issue of the HamSCI newsletter? Now you can!

Among other projects, Dr. Kristina Collins has been busy helping to archive the HamSCI newsletters on Zenodo for permanence and citeability. Each newsletter gets its own DOI, but there is one DOI that encompasses all of them: <https://doi.org/10.5281/zenodo.15257908>.

Thank her when you see her!



JOIN HamSCI

We welcome you to join the HamSCI community! We are a group of amateur radio operators and scientists working together to study the ionosphere and further amateur radio. HamSCI consists of many different types of projects accessible to a variety of skill levels with various focuses on science to engineering to pure amateur radio.

The easiest way to participate in the HamSCI Community is by joining the HamSCI Google Group. The HamSCI Google Group is an e-mail discussion forum to facilitate communication between hams, the professional space and atmospheric science communities, and anyone else interested. When requesting to join, please include some information about who you are and why you would like to join. **Welcome!!**

ABOUT CITIZEN SCIENCE

Citizen science is scientific work undertaken by members of the public, often in collaboration with or under the direction of professional scientists and scientific institutions.

HamSCI engages amateur radio operators to help with the collection and analysis of data to help better understand the changing conditions of "space weather" within the ionosphere. As a HamSCI citizen scientist, you help collect valuable scientific data that can make a meaningful impact on scientific research.

HamSCI collaborators gratefully acknowledge the funding of NSF AGS-2045755, AGS-2230345, AGS-2230346, AGS-2404997, AGS-2432821, AGS-2432824, AGS-2432823, AGS-2432822, AGS-2431666, OPP-2332427, NASA 80NSSC25K7026, 80NSSC23K1322, Frankford Radio Club and ARDC grants.

The HamSCI silhouette photo is by Ann Marie Rogalcheck-Frissell KC2KRQ. Newsletter design by Vikki Lawhon & Kayley LeFaiver, The University of Scranton Creative Services.

WHAT IS HamSCI?

HamSCI, the Ham Radio Science Citizen Investigation, is a platform for the publicity and promotion of projects that are consistent with the following objectives:

- Advance scientific research and understanding through amateur radio activities.
- Encourage the development of new technologies to support this research.
- Provide educational opportunities for the amateur community and the general public.

HamSCI serves as a means for fostering collaborations between professional researchers and amateur radio operators. It assists in developing and maintaining standards and agreements between all people and organizations involved.

HamSCI was started by ham-scientists who study upper atmospheric and space physics. These scientists recognized that projects such as the Reverse Beacon Network, WSPRNet, PSKReporter, DX Cluster, ClubLog, and others are generating big data sets that could provide useful observations of the Earth's ionosphere and related systems. Because of this, HamSCI's initial focus is on these fields of research. In the future, other researchers may join HamSCI and broaden its scope.

For scientists, working with the amateur radio community is a way to access individually managed stations, available by the hundreds in dozens of countries, with receive and transmit capabilities across the electromagnetic spectrum, easily identified in areas of interest and deployed to remote locations, for free.

HamSCI WEEKLY MEETINGS

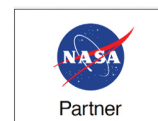
There are numerous ways to learn about and participate in HamSCI activities. We meet three times a week on various aspects of our work:

TAPR/HamSCI Technical Session: This weekly telecon is hosted on Mondays at 9 PM Eastern by TAPR and The University of Scranton to support collaborative HamSCI-TAPR design and hardware projects.

PSWS Operations Session: This weekly telecon is held on Thursdays at 10 AM Eastern, hosted by Case Western Reserve University, to cover operational aspects of the Personal Space Weather Station network.

The HamScience Telecon: Weekly telecon on Thursdays at 4 PM Eastern to discuss data collection, analysis and conclusions related to HamSCI's scientific research efforts. All backgrounds, including researchers, data analysts and citizen scientists, are welcome and encouraged to attend. On the second Thursday of each month there will be an invited speaker.

HamSCI Partners:



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